

Thesis/
Reports
Nachlinger,
J.

TITLE PAGE

Establishment: Record for Seitz Canyon/Echo Lake
Research Natural Area within Humboldt
National Forest, Elko County, Nevada

DECISION NOTICE/DESIGNATION ORDER

Decision Notice Finding of No Significant Impact Designation Order

By virtue of the authority vested in me by the Secretary of Agriculture under regulations at 7 CFR 2.42, 36 CFR 251.23, and 36 CFR Part 219, I hereby establish the Seitz Canyon/Echo Lake Research Natural Area. It shall be comprised of lands described in the section of the Establishment Record entitled "Location".

The Regional Forester has recommended the establishment of this Research Natural Area in the Decision Notice/Finding of No Significant Impact for the Seitz Canyon/Echo Lake Research Natural Area. The analysis was documented in the Environmental Assessment entitled "Environmental Assessment for the Proposed Seitz Canyon/Echo Lake Research Natural Area". The analysis complies with the requirements of 36 CFR 219.25 and FSM 4063.41.

The Seitz Canyon/Echo Lake Research Natural Area will be managed in compliance with all relevant laws, regulations, and Forest Service Manual direction regarding Research Natural Areas. It will be administered in accordance with the management direction/prescription identified in the Establishment Record.

The Humboldt National Forest Land and Resource Management Plan is hereby amended to be consistent with the management direction identified in the Establishment Record and this Decision Notice/Designation Order. This is a non-significant amendment of the Humboldt National Forest Land and Resource Management Plan (36 CFR 219.10(f)).

The Forest Supervisor of the Humboldt National Forest shall notify the public of this decision and mail a copy of the Decision Notice/Designation Order and amended direction to all persons on the Humboldt National Forest Land and Resource Management Plan mailing list.

Based on the Environmental Analysis, I find that designation of the Seitz Canyon/Echo Lake Research Natural Area is not a major Federal action significantly affecting the quality of the human environment. (40 CFR 1508.27.)

This decision is subject to appeal pursuant to 36 CFR Part 217. A Notice of Appeal must be in writing and submitted to:

The Secretary of Agriculture
14th & Independence Ave., S.W.
Washington, D.C. 20250

Any appeal of this decision must include the information required by 36 CFR 217.9 including the reasons for appeal. Two (2) copies of the Notice of Appeal must be filed with the Secretary of Agriculture within 45 days from the date of legal notice of this decision. Review by the Secretary is wholly discretionary. If the Secretary has not decided within 15 days of receiving the Notice of Appeal to review the Chief's decision, appellants will be notified that the Chief's decision is the final administrative decision of the U.S. Department of Agriculture (36 CFR 217.17(a)).

Chief

Date

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

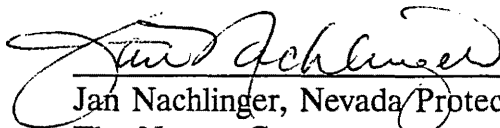
Seitz Canyon/Echo Lake Research Natural Area

Humboldt National Forest

Elko County, Nevada

The undersigned certify that all applicable land management planning and environmental analysis requirements have been met and that boundaries are clearly identified in accordance with FSM 4063.21, Mapping and Recordation and FSM 4063.41 5.e(3) in arriving at this recommendation.

Prepared by



Jan Nachlinger, Nevada Protection Planner,
The Nature Conservancy

Date

7 August 1992

Recommended by

Mont Lewis, District Ranger,
Ruby Mountains Ranger District

Date

Recommended by

John P. Inman, Forest Supervisor,
Humboldt National Forest

Date

Recommended by

Gray F. Reynolds, Regional Forester,
Intermountain Region

Date

Recommended by

Laurence E. Lassen, Director,
Intermountain Research Station

Date

TITLE PAGE

Establishment Record for Seitz Canyon/Echo Lake
Research Natural Area within Humboldt
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Introduction

The Great Basin is a vast semi-arid region of internal drainage lying within the Basin and Range physiographic province (Fenneman, 1931). It is characterized by great relief with hundreds of north-south trending mountain ranges and intervening basins. The mountain ranges support montane and subalpine shrublands and forests, while the highest ranges are capped by isolated alpine communities. The Ruby Mountains of northeastern Nevada are located in the heart of the Great Basin, and have been identified as significant for their alpine ecosystems and rare plant habitats (Van Pelt, 1982). The Seitz Canyon/Echo Lake area is representative of the range and harbors exceptional examples of subalpine and alpine plant communities and topography in near-pristine condition.

Seitz Canyon/Echo Lake RNA lies at high elevations within Elko County, Nevada. The area is managed by the Ruby Mountains Ranger District of the Humboldt National Forest.

Land Management Planning

The Regional Guide for the Intermountain Region provides overall direction for the establishment of research natural areas (USDA Forest Service, 1984). The guide states that RNA establishment is important to help promote and protect natural diversity in all of its forms.

The approved Humboldt National Forest Land and Resource Management Plan identifies Seitz Canyon as a proposed research natural area (USDA Forest Service, 1986). Initial reconnaissance work for the candidate Seitz Canyon RNA in the mid-1980s revealed a conflict with livestock grazing at lower elevations and the resulting reports recommended that more emphasis should be placed on adjacent alpine areas to eliminate this problem (Tuhy *et al.*, 1984; Padgett, 1986). These early reconnaissance reports suggested that the RNA boundary should be shifted southwest into upper Hennen and Seitz canyons to include Ruby Dome, Peak 11,330, and the ridgeline defining the north side of Echo Canyon. Immediately adjacent and south of this area is Echo Lake and Echo Canyon, which had been identified as an area of known importance for its alpine ecosystems, alpine geologic features, and potential for RNA designation by Van Pelt (1982). After consultation with the Ruby Mountains Ranger District, the Intermountain Research Station and The Nature Conservancy decided to evaluate the Echo Lake area for inclusion in a larger Seitz Canyon/Echo Lake RNA that would encompass more subalpine and alpine ecosystems. A reconnaissance of Echo Lake in 1990 found that the area qualified for the research natural area designation (Nachlinger, 1991). Subsequent work in 1991-92 provided additional information needed to prepare this establishment record.

The original candidate Seitz Canyon RNA encompassed about 980 acres (397 ha) (USDA Forest Service, 1986). The revised Seitz Canyon/Echo Lake RNA encompasses

about 2,130 acres (862 ha). The additional acreage draws in about 660 acres (267 ha) managed as wilderness within the Ruby Mountains Wilderness Area (USDA Forest Service, 1990) and about 490 acres (198 ha) managed as multiple use lands within the Ruby Mountains Management Area.

Objectives

The primary objective in establishing the Seitz Canyon/Echo Lake RNA is to provide subalpine and alpine ecosystems in near-pristine condition for non-manipulative research, management, and educational opportunities. In essence, the RNA will function as a control for manipulative management activities in comparable areas and as a baseline for measuring long-term ecological change. In addition, the designation will help to conserve and maintain genetic, species, and ecosystem levels of regional biological diversity in the acreage excluded from the wilderness designation. The Seitz Canyon and Echo Lake areas support representative grassland, shrubland, and forest communities, as well as a unique alpine relict area.

Justification

Great Basin alpine lands and their associated geomorphic features were identified as themes needing representation in the RNA network (Van Pelt, 1982). The Ruby Mountains were recognized as one of several areas of known importance for alpine ecosystems and rare plants. Echo Lake was specifically identified as an area of known significance for its alpine ecosystems, and for alpine glaciation and associated geologic features such as cirque basins, sharp ridgelines, and alpine lakes. The Seitz Canyon/Echo Lake RNA will help to represent central Great Basin alpine ecosystems of the Intermountain Region within the RNA network.

Further, the area provides habitats for three plant taxa and seven animal species of special interest. Establishment of the RNA, which will allow natural ecosystem processes to progress without human interference or conflicting management practices, may help to recover two listed birds and abolish the potential need to list three candidates under the Endangered Species Act.

Principal Distinguishing Features

The Seitz Canyon/Echo Lake RNA is physically and biologically diverse. The major features of the area are listed in table 1. Figures 4 through 18 provide visual illustrations of many of these features.

Table 1. Principal distinguishing features of the Seitz Canyon/Echo Lake RNA. Scientific nomenclature follows Cronquist *et al.* (1972, 1977, 1984, and 1989) or Kartesz (1987) for plants and Banks *et al.* (1987) for animals.

Botanic

Major Vegetation Types

- Salix orestera* (tall willow) communities (So)
- Potentilla fruticosa* (wet and dry shrubland) communities (Pf)
- Pinus albicaulis* (subalpine forest) communities (Pa)
- Alpine barrens (fell-fields, talus and scree) communities (Ab)

Minor Vegetation Types

- Aquatic (submergent) communities (Aq)
- Carex rostrata* (emergent sedge) community (Cr)
- Carex scopulorum* (wetland) communities (Cs)
- Mesic meadow communities (Mm)
- Salix wolfii* (short willow) communities (Sw)
- Short shrub communities (Ss)
- Salix drummondiana* (tall willow) communities (Sd)
- Tall herbaceous communities (Th)
- Subalpine and alpine turf communities (At)

Species of Special Interest

- Astragalus robbinsii* var. *occidentalis*, Robbins western milkvetch
- Cymopterus nivalis*, snow spring parsley
- Primula capillaris*, Ruby Mountain primrose
- Euderma maculata*, spotted bat
- Plecotus townsendii*, western big-eared bat
- Falco peregrinus*, peregrine falcon
- Haliaeetus leucocephalus*, bald eagle
- Otus flammeolus*, flammulated owl
- Picoides tridactylus*, three-toed woodpecker
- Strix nebulosa*, great grey owl

Aquatic

- Cirque lake (Echo Lake)
- Beaver lake (Seitz Lake)
- Moraine lake (in Echo Canyon)

Landforms

- Cirque basins, lakes, and headwalls
- U-shaped valleys

Table 1. Continued

<u>Landforms</u>
Cliff bands, couloirs, and jagged ridgelines
Nunatak
<u>Geologic</u>
Igneous—Gneissose granite
Metamorphic—
Gneiss
Metaquartzite
Quartzose schist
Unfossiliferous marble

Location

Seitz Canyon/Echo Lake RNA is located west of the crest of the Ruby Mountains on the Ruby Mountains District of the Humboldt National Forest (fig. 1). It is roughly 8 mi (13 km) south of Lamoille located in Lamoille Valley, and about 3.5 mi (5.5 km) southwest of the Thomas Creek campground located in Lamoille Canyon, Elko County, Nevada. Longitude and latitude near the center of the area are 115° 28' West and 40° 37' North, respectively. The legal description of its location is Township 32 North, Range 58 East, portions of sections 19-21, 28-30, 32, and 33; and, a small portion of unsurveyed Township 31 North, Range 58 East, Mount Diablo Meridian. The Seitz Canyon and Echo Lake areas are illustrated on USGS Lamoille and Ruby Dome 7.5' topographic quadrangles (fig. 2). Other useful maps are the USGS Lamoille 15' topographic quadrangle (out of print) and the USDA Forest Service Ruby Mountains Ranger District map (1/2 in/mi scale).

The boundary of the Seitz Canyon/Echo Lake RNA is defined primarily by topographic features except where canyons are spanned (fig. 2). The boundary is described as follows: Starting at the ridgeline defining the south side of Echo Canyon at the unnamed twin peaks 10,360 (southwest boundary corner), follow the ridgeline northeast for about 1.3 mi (2.1 km) to the north-south trending ridgeline just 600 ft (183 m) north of Peak 10,882 (southeast boundary corner); then turn north northwest and follow the ridgeline 1.1 mi (1.8 km) to Mount Gilbert, and another 1.2 mi (1.9 km) to a point at 10,080 ft (3,072 m) (northeast boundary corner); then turn west northwest and span Seitz Canyon 1 mi (1.6 km) to Peak 10,182; then turn west southwest and span the canyon of the south fork of Rabbit Creek 0.7 mi (1.1 km) to the unnamed peak 10,040 above

Hennen Canyon (northwest boundary corner); then turn south and follow the ridgeline about 1.4 mi (2.2 km) to Ruby Dome (west central boundary corner); then turn east and southeast for 0.8 mi (1.3 km) to Peak 11,330 on the ridgeline separating the Seitz and Echo drainages; finally, turn south and span Echo Canyon 1 mi (1.6 km) to the starting point at the unnamed twin peaks 10,360. This boundary defines about 2,130 acres (862 ha) of high-elevation country.

Access

Access to the higher elevations of the Ruby Mountains is somewhat difficult because of the checkerboard nature of land ownership along the northwestern flanks of the range, with the exception of high routes out of the head of Lamoille Canyon. The Forest Service has agreements with a few private land owners to provide access to National Forest lands. Once land owners have been contacted visitors may travel through locked and unlocked gates to trailheads. Access to the Echo Lake area is made from the west on a rough two-wheel drive road through the Te-moak Indian Reservation and on Forest trails. Access to the Seitz Canyon area is made from the northwest through private lands at Ruby Dome Ranch. The main access routes are shown on figure 1.

To approach the Echo Lake area, drive south from Elko on State Route 228 about 20 mi (32 km) to the junction for Lee. Veer right and continue along this road for about 5.5 mi (9 km) to another junction just north of Lee. Turn north toward Pleasant Valley and go about 1.7 mi (2.7 km) to Forest Route 121. A series of unlocked private pasture gates block access up this road and permission to pass should be obtained from local Te-moaks in Lee. Continue another 3.5 mi (5.5 km) east to the Welch Creek crossing. A four-wheel drive vehicle would provide the means to continue about another 1.2 mi (2 km) to the Echo Lake trailhead, although the road is easily hiked. Hike along Forest Trail 107 up Echo Canyon about 5 mi (8 km) to the lake. A short cross-country route up the slopes north of the lake to a saddle provides access to alpine lands in upper Seitz Canyon.

To approach the Seitz Canyon area, drive south from Lamoille on the road into Lamoille Canyon (Forest Road 660) about 2.5 mi (4 km) to the entrance to Ruby Dome Ranch. Permission to pass through a locked gate should be obtained from the land owner. Drive about 1 mi (1.6 km) southeast along the four-wheel drive road in Seitz Canyon to the road end. Hike along Forest Trail 039 up Seitz Canyon about 3 mi (4.8 km) to Seitz Lake. Cross-country routes up steep slopes provide access to the upper basin.

In winter, the RNA is snow-covered and access to it is limited by the snowpack at lower elevations and avalanche potential at higher elevations. Determined researchers could access the RNA via long cross-country skiing (or snowmobiling) routes that follow the hiking routes. Well-funded researchers could readily access the RNA via helicopter service from Lamoille.

Area by Cover Types

Vegetation in the Seitz Canyon/Echo Lake area is representative of high elevations in the northern Ruby Mountains. The RNA provides a diversity of forest and non-forest cover types. Table 2 gives estimates of area by cover types, Kuchler vegetation types, and natural communities. The approximate boundaries of the major plant communities are shown in figure 3.

Table 2. Cover types and estimates of acreage for the Seitz Canyon/Echo Lake Research Natural Area.

Vegetation Type	Estimated Area	
	Acres	Hectares
Cover Types (Eyre, 1980):		
208 Whitebark Pine	320	130
Non-forest	<u>1,810</u>	<u>732</u>
Total	2,130	862
Kuchler Types (Kuchler, 1964 and 1966):		
8 Lodgepole Pine - Subalpine Forest	320	130
45 Alpine barrens and meadows	1,535	621
Unclassified	<u>275</u>	<u>110</u>
Total	2,130	862
Plant Communities and Associations (Loope, 1969; Holland, 1986; Manning and Padgett, 1989):		
Aquatic	23	9
<i>Carex rostrata</i>	2	1
<i>Carex scopulorum</i>	5	2
Mesic meadows (<i>Deschampsia cespitosa</i> , <i>Carex microptera</i>)	20	8
<i>Salix wolfii</i>	5	2
Short shrub (<i>Vaccinium uliginosum</i> ssp. <i>occidentale</i>)	15	6
<i>Salix drummondiana</i>	20	8
<i>Salix orestera</i>	95	38
<i>Potentilla fruticosa</i> (<i>Deschampsia cespitosa</i> , <i>Festuca idahoensis</i>)	85	34
Tall herbaceous (<i>Polygonum phytolaccaefolium</i>)	5	2

Table 2. Continued.

Vegetation Type	Estimated Area	
	Acres	Hectares
Plant Communities and Associations:		
<i>Pinus albicaulis</i>	320	130
Subalpine and alpine turf (<i>Geum rossii</i> var. <i>turbinatum</i>) . .	25	10
Alpine barrens (<i>Silene acaulis</i> , <i>Cystopteris fragilis</i>)	<u>1,510</u>	<u>611</u>
Total	2,130	862

Physical and Climatic Conditions

The Seitz Canyon/Echo Lake RNA occupies the upper elevations of the northern Ruby Mountains from about 8,600 ft (2,621 m) in Seitz Canyon to 11,387 ft (3,471 m) at Ruby Dome. Thus, about 2,800 vertical feet (853 m) of subalpine and alpine landscapes are included in the area. The RNA lies within the Humboldt River Basin watershed—the northern part drains into Lamoille Valley and the main fork of the Humboldt River, while the southern part drains into the South Fork of the Humboldt River.

The Ruby Mountains are considered one of the most spectacular ranges in the Great Basin with their extensively glaciated alpine areas (McLane, 1978). Topographic features of middle and lower elevations within the RNA include glacially-carved U-shaped valleys, broad slopes, lateral moraines, steep cliff bands, cirque basins, and several perennial lakes and streams (figs. 4-6, and 15). Uppermost elevations include examples of classic glacially-carved terrain—sheer headwalls and couloirs, jagged ridgelines, domes, upper cirque basins, and a sloping relict area (nunatak) that remained ice-free during glacial periods (figs. 5-6, 13, and 16-17).

The climate of the region is characterized by (Houghton *et al.*, 1975; Hidy and Klieforth, 1990). Eastern Nevada has a semi-arid continental climate as a result of the Sierra Nevada's rain shadow effect. Winters are characterized by cold temperatures and substantial snowfall. Summers are usually mild and dry as a result of a northward shift of the subtropical high pressure belt and a lack of available moisture from the Pacific Ocean.

No historical climate data exist for the higher elevations within the RNA. The National Oceanic and Atmospheric Administration (NOAA) monitors climate at several locations in the region including Elko, Lamoille, Jiggs, and Wells. The closest stations to the RNA are at Lamoille and Jiggs; however, records from these stations are recent and

do not have calculated long-term averages. Data from the Elko and Wells stations are shown in the following tables because they provide 30-year averages from 1951 through 1980 (NOAA, 1990). These stations indicate drier and warmer conditions than those found at lower elevations within the Seitz Canyon/Echo Lake RNA. Table 3 shows elevation and location relative to the RNA for the Elko and Wells stations.

Table 3. Elevation and location of climate stations near Seitz Canyon/Echo Lake RNA.

<u>Station</u>	<u>Elevation</u>	<u>Distance from RNA</u>	<u>Direction from RNA</u>
Elko	5,050 ft (1,539 m)	22 mi (35 km)	Northwest
Wells	5,650 ft (1,722 m)	43 mi (69 km)	Northeast

Precipitation and temperature means for these stations are given in tables 3 and 4, respectively.

Table 4. Precipitation data (in inches and cm) from NOAA climate data stations near Seitz Canyon/Echo Lake RNA.

<u>Station</u>	<u>Annual</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Elko	9.30 in 23.6 cm	1.16 2.95	0.81 2.06	0.85 2.16	0.79 2.01	1.03 2.62	0.91 2.31	0.33 0.84	0.58 1.47	0.47 1.19	0.56 1.42	0.83 2.11	0.98 2.49
Wells	9.89 in 25.1 cm	0.94 2.39	0.75 1.91	0.81 2.06	0.85 2.16	1.35 3.43	1.12 2.84	0.46 1.17	0.54 1.37	0.63 1.60	0.72 1.83	0.83 2.11	0.89 2.26

Table 5. Temperature data (in degrees Fahrenheit and Centigrade) from NOAA climate data stations near Seitz Canyon/Echo Lake RNA.

<u>Station</u>	<u>Annual</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Elko	46.2 °F 7.9 °C	25.0 -3.9	31.0 -0.6	36.0 2.2	43.4 6.3	52.4 11.3	61.2 16.2	70.1 21.2	67.6 19.8	58.4 14.7	47.5 8.6	35.3 1.8	26.1 -3.3

Table 5. Continued.

<u>Station</u>	<u>Annual</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Wells	44.3 °F	23.5	28.6	33.8	41.7	50.7	59.3	68.1	65.3	56.4	45.5	33.4	24.6
	6.8 °C	-4.7	-1.9	1.0	5.4	10.4	15.2	20.1	18.5	13.6	7.5	0.8	-4.1

Description of Values

Flora and Communities

The Ruby Mountains are floristically classified within the Central Great Basin section of the Great Basin division of the Intermountain region (Cronquist *et al.*, 1972). This section is floristically unique in that the flora has evolved in place since major plant migrations occurred from the Rocky Mountains and Western Cordilleran source areas (Reveal, 1978).

The Rubies are considered to be the most species rich of all Great Basin ranges (Loope, 1969; Cronquist *et al.*, 1972) and the Seitz Canyon/Echo Lake area is no exception. Field identifications and collections of the flora in the Seitz Canyon/Echo Lake area yielded 242 plant taxa within the bounds of the RNA (table 6). One hundred and seventy-four taxa, or 72 percent of all plants identified in the area, are categorized as alpine plants based on their known distributions in alpine communities of North America. Additional plant species probably occur in the area.

Three taxa present within the area are of special concern. Robbins western milkvetch (*Astragalus robbinsii* var. *occidentalis*) and Ruby Mountain primrose (*Primula capillaris*) are federal category 2 candidates for listing as endangered or threatened under the Endangered Species Act by the U.S. Fish and Wildlife Service (Federal Register, 1990; Morefield and Knight, 1992). Ruby Mountain primrose is also listed by Nevada as a state critically endangered plant species (Morefield and Knight, 1992). In addition, the snow spring parsley (*Cymopterus nivalis*) is considered sensitive by the Intermountain Region (USDA Forest Service, 1991a).

Table 6. Plant taxa known to occur in the Seitz Canyon/Echo Lake RNA and their presence in thirteen recognized plant communities. Scientific nomenclature follows Cronquist *et al.* (1972, 1977, 1984, and 1989), Little (1979), or Kartesz (1987).

Scientific Name	Common Name	Plant Communities ¹
<i>Achillea millefolium</i>	western yarrow	Pf, Ab
<i>Aconitum columbianum</i>	Columbia monkshood	
<i>Adiantum pedatum</i>	alpine maidenhair	Ab
<i>Agastache urticifolia</i>	nettle-leaf horsemint	Th, Pa
<i>Agoseris aurantiaca</i>	orange-flower mountain dandelion	Pa
<i>Agoseris glauca</i>	short-beak mountain dandelion	Mm, Pf, Pa
<i>Agropyron trachycaulum</i>	slender wheatgrass	Th, Pa
<i>Agrostis exarata</i>	spike redtop	
<i>Agrostis humilis</i>	mountain bentgrass	So, Pf
<i>Agrostis scabra</i>	ticklegrass	
<i>Allium biceptrum</i>	patis onion	Pa
<i>Allium brandegei</i>	Brandegee onion	Th
<i>Allium validum</i>	swamp onion	Cs, So
<i>Alopecurus aequalis</i>	short foxtail	
<i>Amelanchier alnifolia</i>	western serviceberry	Pa
<i>Angelica kingii</i>	King angelica	So
<i>Antennaria alpina</i> var. <i>media</i>	alpine pussytoes	Th, At, Ab
<i>Antennaria microphylla</i>	small-leaf pussytoes	
<i>Antennaria rosea</i>	rosy pussytoes	Ss, Pf, Th, Pa, Ab
<i>Antennaria umbrinella</i>	brown pussytoes	Mm, Ss, Pf, Th, Pa, Ab
<i>Aquilegia formosa</i>	western columbine	Pa
<i>Arabis drummondii</i>	Drummond rock cress	Ss, Pa
<i>Arabis holboellii</i> var. <i>pinetorum</i>	Holboell rock cress	Pa
<i>Arabis lyallii</i> var. <i>lyallii</i>	Lyll rock cress	Mm, Ab
<i>Arabis platysperma</i>	broad-seed rock cress	At, Ab
<i>Arabis</i> sp.	rock cress	Ab
<i>Arenaria aculeata</i>	spiny sandwort	Pf, Th, Pa, Ab
<i>Arnica cordifolia</i>	heart-leaf arnica	Pa
<i>Arnica mollis</i>	Cordilleran arnica	Mm, So, Pa, Ab
<i>Artemisia ludoviciana</i>	western mugwort	Ab
<i>Artemisia tridentata</i>		
ssp. <i>vaseyana</i>	mountain big sagebrush	Pa
<i>Aster chilensis</i>	common California aster	So
<i>Aster foliaceus</i>	leafy aster	
<i>Aster occidentalis</i>	western mountain aster	So
<i>Aster perelegans</i>	elegant aster	So

Table 6. Continued.

Scientific Name	Common Name	Plant Communities ¹
<i>Astragalus kentrophyta</i>	kentrophyta	Ab
<i>Astragalus robbinsii</i> var. <i>occidentalis</i>	Robbins western milkvetch	At
<i>Athyrium felix-femina</i>	lady fern	Ss, So, Pf, Ab
<i>Barbarea orthoceras</i>	winter cress	Mm, Pf
<i>Botrychium lunaria</i>	moonwort	
<i>Brickellia grandiflora</i>	large-flower brickellbush	Ab
<i>Bromus carinatus</i>	mountain brome	Pf, Pa
<i>Calamagrostis canadensis</i>	Canada bluejoint	Pa
<i>Calamagrostis neglecta</i>	reedgrass	
<i>Callitriche palustris</i>	spiny water starwort	Aq
<i>Caltha leptosepala</i>	slender-sepal marsh marigold	Mm, Ab
<i>Carex athrostachya</i>	slenderbeak sedge	So
<i>Carex atrata</i>	various-nerve sedge	Pf, At, Ab
<i>Carex aurea</i>	goldenfruit sedge	Ss
<i>Carex canescens</i>	silvery sedge	So
<i>Carex dioica</i> var. <i>gynocrates</i>	northern bog sedge	
<i>Carex ebenea</i>	ebony sedge	Mm, At
<i>Carex elynoides</i>	black-root sedge	So, Pa, At, Ab
<i>Carex hoodii</i>	wire sedge	Pa
<i>Carex illota</i>	sheep sedge	
<i>Carex luzulina</i>	woodrush sedge	Cs, So, Pf, Pa, At
<i>Carex microptera</i>	small-wing sedge	Mm, Pf, Ab
<i>Carex multicosata</i>	many-rib sedge	Ss, Pf, Th, Pa, Ab
<i>Carex nigricans</i>	black alpine sedge	So, At
<i>Carex nova</i>	black sedge	Th, At
<i>Carex phaeocephala</i>	mountain hare sedge	Mm, Pf, Th, Ab
<i>Carex rostrata</i>	beaked sedge	Cr
<i>Carex saxatilis</i>	rock sedge	
<i>Carex scirpoidea</i> var. <i>pseudoscirpoidea</i>	western single-spike sedge	Ss, So, Th
<i>Carex scopulorum</i>	mountain sedge	Cs, So, Pa
<i>Carex</i> sp.	sedge	Sd, So, Pf, Ab
<i>Castilleja viscidula</i>	sticky paintbrush	Th, At, Ab
<i>Castilleja miniata</i>	great red paintbrush	Mm, Ss, Pf, Th, Pa
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i>	sticky rabbitbrush	Pa
<i>Cirsium scariosum</i>	meadow thistle	Mm, Pf, Th, Ab

Table 6. Continued.

Scientific Name	Common Name	Plant Communities ¹
<i>Cryptogramma crispa</i>	American rock brake	Ss, Pf, Th, Ab, Ab
<i>Cymopterus nivalis</i>	snow spring parsley	At, Ab
<i>Cystopteris fragilis</i>	brittle fern	Ab
<i>Danthonia intermedia</i>	timber oatgrass	
<i>Danthonia unispicata</i>	one-spike oatgrass	Ab
<i>Delphinium depauperatum</i>	dwarf larkspur	Pf, Th, Pa
<i>Deschampsia cespitosa</i>	tufted hairgrass	Mm, Ss, Pf, Ab
<i>Deschampsia elongata</i>	slender hairgrass	So, Pf
<i>Descurainia richardsonii</i>	gray tansy mustard	Pa
<i>Dodecatheon alpinum</i>	alpine shooting star	So, Pf, At
<i>Dodecatheon pulchellum</i>	dark-throat shooting star	Cs, Ss, So
<i>Draba sphaeroides</i>		
var. <i>sphaeroides</i>	mountain whitlow grass	Pa, Ab
<i>Draba stenoloba</i>	Alaska whitlow grass	Mm
<i>Draba</i> sp.	whitlow grass	At
<i>Eleocharis pauciflora</i>	small-flower spikerush	Aq, Cs
<i>Elymus glaucus</i>	blue wildrye	Pa
<i>Epilobium anagallidifolium</i>	alpine willowherb	Cs, Mm, At
<i>Epilobium angustifolium</i>	fireweed	Pf, Pa
<i>Epilobium hornemannii</i>	Hornemann willowherb	Ss
<i>Epilobium lactiflorum</i>	white-flower willowherb	Pf, Ab
<i>Epilobium</i> sp.	willowherb	At
<i>Erigeron asperugineus</i>	Idaho fleabane	Th, Pa, At
<i>Erigeron compositus</i>	cut-leaf fleabane	Ab
<i>Erigeron leiomeris</i>	glaber fleabane	Pf, At, Ab
<i>Erigeron peregrinus</i> ssp.		
<i>callianthemus</i> var. <i>c.</i>	wandering fleabane	Cs, Ss, So, Pf, Th, Pa, At
<i>Erigeron watsonii</i>	Watson fleabane	Th, Ab
<i>Erigeron</i> sp.	fleabane	At
<i>Eriogonum heracleoides</i>	parsnip-flower buckwheat	Pf, Th, Pa, Ab
<i>Eriogonum kingii</i>	King buckwheat	Pf, Ab
<i>Eriogonum ovalifolium</i>	cushion buckwheat	Ab
<i>Eriogonum umbellatum</i>		
var. <i>umbellatum</i>	sulphur-flower buckwheat	Th, Pa
<i>Eriophyllum lanatum</i>		
var. <i>integrifolium</i>	common woolly sunflower	Th
<i>Eupatorium occidentale</i>	western eupatorium	Ab
<i>Festuca idahoensis</i>	Idaho fescue	Pf, Th, Pa, Ab

Table 6. Continued.

Scientific Name	Common Name	Plant Communities ¹
<i>Festuca ovina</i>	alpine fescue	Ab
<i>Frasera speciosa</i>	green gentian	Ab
<i>Gaultheria humifusa</i>	alpine wintergreen	At
<i>Gayophytum diffusum</i>	diffuse gayophytum	Pf, Pa, Ab
<i>Gentiana affinis</i>	pleated gentian	
<i>Gentiana calycosa</i>	mountain gentian	Ss
<i>Geum macrophyllum</i>	large-leaf avens	
<i>Geum rossii</i> var. <i>turbinatum</i>	alpine avens	Pf, Pa, At, Ab
<i>Gilia tenerrima</i>	delicate gilia	So
<i>Glyceria striata</i>	fowl mannagrass	
<i>Gnaphalium palustre</i>	marsh everlasting	Pf
<i>Habenaria dilatata</i>		
var. <i>leucostachys</i>	bog white orchid	Cs, Pf
<i>Hackelia micrantha</i>	meadow forget-me-not	Sd, So, Pa
<i>Haplopappus acaulis</i>	cushion goldenweed	Ab
<i>Haplopappus macronema</i>	white-stem goldenweed	Pf, Pa, Ab
<i>Helenium hoopesii</i>	tall mountain sneezeweed	Pf, Pa
<i>Helianthella uniflora</i>	little sunflower	Mm, Pa, Ab
<i>Heuchera parvifolia</i>	little-leaf alumroot	Pa, Ab
<i>Holodiscus dumosus</i>	oceanspray	Ab
<i>Hulsea algida</i>	alpine hulsea	Ab
<i>Hypericum formosum</i>		
ssp. <i>scouleri</i>	Scouler St. Johnswort	Th
<i>Isoetes bolanderi</i>	Braun quillwort	Aq
<i>Ivesia baileyi</i>	Bailey ivesia	Ab
<i>Juncus balticus</i>	Baltic wirerush	Mm
<i>Juncus bufonius</i>	toad rush	Pf
<i>Juncus confusus</i>	Colorado rush	So
<i>Juncus drummondii</i>	Drummond rush	So, Pf, Ab
<i>Juncus longistylis</i>	long-style rush	Cs, So
<i>Juncus mertensianus</i>	Merten rush	Cs, Pf
<i>Juncus parryi</i>	Parry rush	Mm, Ss, Th, Pa
<i>Juncus</i> sp.	wirerush	Mm
<i>Juniperus communis</i>	common juniper	Pf, Pa
<i>Kalmia microphylla</i>	swamp laurel	So
<i>Kelloggia galioides</i>	milk kelloggia	Cs, Ss
<i>Ledum glandulosum</i>	glandular Labrador tea	Ss, So, Pf
<i>Leucopoa kingii</i>	spike fescue	Ab

Table 6. Continued.

Scientific Name	Common Name	Plant Communities ¹
<i>Lewisia pygmaea</i>	dwarf lewisia	Mm, Ss, Pf, Th, Ab
<i>Ligusticum grayi</i>	gray lovage	Cs, Ss, So, Pf, Pa, Ab
<i>Lithophragma tenellum</i>	smooth lithophragma	Ab
	liverworts	Mm, Ab
<i>Lupinus caudatus</i>	spurred lupine	Pa
<i>Luzula parviflora</i>	small-flower woodrush	
<i>Luzula spicata</i>	spike woodrush	Mm, Pf, Pa, Ab
<i>Machaeranthera canescens</i>	hoary tansy-aster	Th, Ab
<i>Melica bulbosa</i>	western oniongrass	Pa
<i>Melica spectabilis</i>	purple oniongrass	Pa
<i>Mertensia ciliata</i>	mountain bluebell	Cs, Mm, So, Pf, Pa, Ab
<i>Mertensia oblongifolia</i>	western bluebell	At
<i>Mimulus breweri</i>	Brewer monkeyflower	Pf
<i>Mimulus primuloides</i>	primrose monkeyflower	Cs
<i>Mimulus tilingii</i>	subalpine monkeyflower	So, At
<i>Mimulus</i> sp.	monkeyflower	
<i>Monardella odoratissima</i>	mountain pennyroyal	Th
	mosses	Mm, So
<i>Muhlenbergia filiformis</i>	pullup muhly	Pf
<i>Oxyria digyna</i>	alpine sorrel	Ab
<i>Parnassia fimbriata</i>		
var. <i>intermedia</i>	fringed grass-of-parnassus	Cs
<i>Pedicularis groenlandica</i>	elephant heads	Cs, Mm, Ss
<i>Pellaea breweri</i>	Brewer cliffbrake	Ab
<i>Pellaea glabella</i>	smooth cliffbrake	Ab
<i>Penstemon procerus</i>		
var. <i>modestus</i>	small-flower beardtongue	Pf, Th, Pa, Ab
<i>Penstemon speciosus</i>	showy beardtongue	Pf, Ab
<i>Penstemon watsonii</i>	Watson beardtongue	Pa
<i>Penstemon</i> sp.	beardtongue	
<i>Perideridia gairdneri</i>	Gairdner yampah	Pf, Th, Pa
<i>Phacelia hastata</i>	silverleaf phacelia	Pf, Ab
<i>Phacelia hydrophylloides</i>	waterleaf phacelia	Ss
<i>Phacelia sericea</i>	silky phacelia	Pa
<i>Phleum alpinum</i>	alpine timothy	Ss, Pf, Pa, Ab
<i>Phlox pulvinata</i>	cushion phlox	Ab
<i>Phoenicaulis cheiranthoides</i>	dagger pod	
<i>Pinus albicaulis</i>	whitebark pine	Pa

Table 6. Continued.

Scientific Name	Common Name	Plant Communities ¹
<i>Pinus flexilis</i>	limber pine	Pa
<i>Poa epilis</i>	skyline bluegrass	Ss, Pa, Ab
<i>Poa fendleriana</i>	muttongrass	Ss, Th, Pa
<i>Poa nervosa</i>	Wheeler bluegrass	Pf, Pa
<i>Poa reflexa</i>	nodding bluegrass	
<i>Poa rupicola</i>	timberline bluegrass	At
<i>Poa</i> spp.	bluegrass	Pf, Pa, Ab
<i>Polemonium viscosum</i>	sky pilot	Ab
<i>Polygonum bistortoides</i>	western bistort	Cs, Mm, Ss, Pf, Pa
<i>Polygonum confertiflorum</i>	dense-flower knotweed	Pf
<i>Polygonum douglasii</i>		
var. <i>latifolium</i>	Douglas knotweed	Pa
<i>Polygonum kelloggii</i>	Kellogg knotweed	
<i>Polygonum minimum</i>	dwarf knotweed	Pf
<i>Polygonum phytolaccaefolium</i>	mountain lace	Mm, Ss, Th, Pa
<i>Polygonum viviparum</i>	alpine bistort	Ab
<i>Polystichum lonchitis</i>	holly fern	Ab, Ab
<i>Populus tremuloides</i>	quaking aspen	
<i>Potentilla diversifolia</i>	wedge-leaf cinquefoil	Mm, Pf
<i>Potentilla drummondii</i>	Drummond cinquefoil	Ss, Ab
<i>Potentilla fruticosa</i>	shrubby cinquefoil	Pf, Pa, Ab
<i>Potentilla glandulosa</i>		
ssp. <i>nevadensis</i>	sitcky cinquefoil	Pa
<i>Potentilla gracilis</i> ssp. <i>nuttallii</i>	slender cinquefoil	Cs, Pa
<i>Primula capillaris</i>	Ruby Mountain primrose	Ab
<i>Primula parryi</i>	Parry primrose	Ab
<i>Pterospora andromeda</i>	pinedrops	So
<i>Ranunculus eschscholtzii</i>	Eschscholtz buttercup	At
<i>Ribes cereum</i>	squaw currant	Sd, Pa
<i>Ribes montigenum</i>	alpine prickly gooseberry	Pf, Pa, Ab
<i>Rorippa curvipes</i>	blunt-leaf yellow cress	Aq
<i>Rubus idaeus</i> ssp. <i>sachalinensis</i>	western red raspberry	Pa
<i>Rudbeckia occidentalis</i>	western coneflower	Pa
<i>Rumex paucifolius</i>	meadow dock	Th
<i>Sagina saginoides</i>	arctic pearlwort	Pf, At, Ab
<i>Salix arctica</i>	arctic willow	At
<i>Salix drummondiana</i>	Drummond willow	Sd
<i>Salix glauca</i>	glaucous willow	Ss

Table 6. Continued.

Scientific Name	Common Name	Plant Communities ¹
<i>Salix orestera</i>	gray-leaf Sierra willow	So, Pa
<i>Salix reticulata</i> ssp. <i>nivalis</i>	net-vein willow	At
<i>Salix wolfii</i>	Wolf willow	Sw, Ss, Th
<i>Salix</i> sp.	willow	Cs
<i>Saxifraga cernua</i>	nodding saxifrage	Mm
<i>Saxifraga odontoloma</i>	brook saxifrage	So, At
<i>Saxifraga rhomboidea</i>	diamond-leaf saxifrage	Ss, Pf, At
<i>Saxifraga</i> sp.	saxifrage	Ab
<i>Sedum debile</i>	weak-stem stonecrop	Pf, Pa
<i>Sedum integrifolium</i>	king's crown stonecrop	Ss, Pf, Pa
<i>Selaginella selaginoides</i>	northern spikemoss	
<i>Selaginella watsonii</i>	alpine spikemoss	Pf
<i>Senecio amplexans</i>	alpine butterweed	At, Ab
<i>Senecio dimorphophyllus</i> var. <i>paysonii</i>	two-leaf groundsel	Ss, Pf, Th, Pa
<i>Senecio multilobatus</i>	basin butterweed	Th, Ab
<i>Senecio pauperculus</i>	Canadian butterweed	
<i>Senecio pseud aureus</i>	streambank butterweed	Cs, So
<i>Senecio streptanthifolius</i>	cleft-leaf groundsel	At
<i>Senecio</i> sp.	groundsel	So, At
<i>Sibbaldia procumbens</i>	creeping sibbaldia	Mm, Th
<i>Silene acaulis</i>	moss campion	At, Ab
<i>Silene douglasii</i>	Douglas catchfly	So, Th, Pa
<i>Sitanion hystrix</i>	mountain squirreltail	Th, Pa, Ab
<i>Smelowskia calycina</i>	alpine smelowskia	Mm, Ab
<i>Solidago multiradiata</i>	alpine goldenrod	Ab
<i>Sparganium angustifolium</i>	bur-reed	Aq
<i>Stellaria jamesiana</i>	sticky starwort	Pa
<i>Stellaria umbellata</i>	umbellate chickweed	At
<i>Stipa columbiana</i>	Columbia needlegrass	Pf, Th
<i>Stipa lettermanii</i>	Letterman needlegrass	Th, Pa
<i>Stipa pinetorum</i>	pine needlegrass	Ab
<i>Stipa</i> sp.	needlegrass	Ab
<i>Swertia perennis</i>	felwort	Sw
<i>Symphoricarpos oreophilus</i>	mountain snowberry	Pa
<i>Thalictrum fendleri</i>	Fendler meadow rue	Sd, So, Pf, Pa
<i>Thermopsis rhombifolia</i> var. <i>montana</i>	golden pea	Pa

Table 6. Continued.

Scientific Name	Common Name	Plant Communities ¹
<i>Trifolium</i> sp.	clover	Cs, Ss
<i>Trisetum spicatum</i>	spike trisetum	Ss, So, Pf, Th, Pa, Ab
<i>Trisetum wolfii</i>	beardless trisetum	
<i>Vaccinium cespitosum</i>	dwarf blueberry	Mm, Ss, So, Pf, Th, Pa
<i>Vaccinium uliginosum</i> ssp. <i>occidentale</i>	bog blueberry	Ss, So
<i>Valeriana occidentalis</i>	western valerian	Pa
<i>Veratrum californicum</i>	corn lily	Cs, Mm, Pa
<i>Veronica wormskjoldii</i>	American alpine speedwell	Cs, Ss
<i>Viola adunca</i> var. <i>oxyceras</i>	western bog violet	Mm

¹ Plant community abbreviations are as follows:

Aq	Aquatic	So	<i>Salix orestera</i>
Cr	<i>Carex rostrata</i>	Pf	<i>Potentilla fruticosa</i>
Cs	<i>Carex scopulorum</i>	Th	Tall herbaceous
Mm	Mesic meadows	Pa	<i>Pinus albicaulis</i>
Sw	<i>Salix wolfii</i>	At	Subalpine and alpine turf
Ss	Short shrub	Ab	<i>Alpine barrens</i>
Sd	<i>Salix drummondiana</i>		

Thirteen plant communities were recognized within the boundary of Seitz Canyon/Echo Lake RNA. The estimated extent of each is provided in table 2. Approximate bounds of the major communities are shown in figure 3. The descriptions of the plant communities that follow are based primarily on original field work including Tuhy et al. (1984). Several vegetation studies and classifications provided additional information (Loope, 1969; Lewis, 1971; Holland, 1986; Manning and Padgett, 1989). The first eight communities are wetland or riparian communities, while the last five are upland communities. Overall, the communities are in near-pristine condition.

1. Aquatic (Aq):

Associations of aquatic plants occur in the shallow waters of lakes and ponds present in the RNA (fig. 7). They are not species rich communities, but are dominated

by plants that occur in no other associations. Aquatic species include *Isoetes bolanderi*, *Callitriche palustris*, *Eleocharis pauciflora*, and *Rorippa curvipes*.

2. *Carex rostrata* (Cr):

Pure stands of *Carex rostrata* occur in shallow, slowly-flowing or standing water at lake margins in Seitz Canyon (fig. 7).

3. *Carex scopulorum* (Cs):

Very wet meadows occur at lake margins, in depressions with soggy ground, and seepy flats and slopes. These communities have soils with high organic content. *Carex scopulorum* dominates, but other graminoids and broad-leaved herbs may be present (fig. 7). Conspicuous species include *Caltha leptosepala* and *Ranunculus eschscholtzii*.

4. Mesic meadows (Mm):

Wet and moist areas that gradually lose moisture through the growing season, but do not actually dry out are dominated by mesic meadows. These communities occur on flat to sloping ground and have loamy soils. Graminoids dominate, such as *Deschampsia cespitosa*, *Carex atrata*, *C. ebenea*, *C. microptera*, and *Juncus parryi*. Mesic meadows are semi-rich in associated herbaceous plant species, such as, *Epilobium anagallidifolium*, *Veronica wormskjoldii*, and *Viola adunca* var. *oxyceras*.

5. *Salix wolfii* (Sw):

Short willow communities dominated by *Salix wolfii* occur on semi-boggy sites (figs. 8-9). The willow forms a dense layer that sometimes precludes any herbaceous understory layer. In openings species such as *Carex scirpoidea* var. *pseudoscirpoidea*, *C. luzulina*, *Ligusticum grayi*, *Swertia perennis*, and *Veratrum californicum*, may be found.

6. Short shrub (Ss):

Short shrub communities are diverse in the area and may be dominated by ericaceous shrubs or other species of willow. They occur on seepy sideslopes and terraces of fractured bedrock and are scattered as small patches throughout the area (fig. 10). Common species include *Vaccinium uliginosum* ssp. *occidentale*, *Ledum glandulosum*, and *Salix glauca*.

7. *Salix drummondiana* (Sd):

These communities are tall willow-dominated associations that occur along drainages and at high elevation headwaters (figs. 9 and 11). They form dense patches with few understory species. *Hackelia micrantha*, *Ribes cereum*, and *Thalictrum fendleri* are common associates.

8. *Salix orestera* (So):

The tall willow communities dominated by *Salix orestera* are very common in the RNA. They dominate on moist sites of sideslopes and benches (figs. 9 and 12). Associated species include *Carex luzulina*, *Ligusticum grayi*, *Mertensia ciliata*, *Senecio pseud aureus*, and *Thalictrum fendleri*.

9. *Potentilla fruticosa* (Pf):

Communities dominated by *Potentilla fruticosa* are common and variable. They come in wetter and drier types, with the wetter types transitional to other shrub-dominated riparian communities (fig. 13). Associated species on moist sites include *Carex scirpoidea* var. *pseudoscirpoidea*, *Deschampsia cespitosa*, and *Ligusticum grayi*, while associates on drier sites include *Arenaria aculeata* and *Festuca idahoensis*.

10. Tall herbaceous (Th):

Subalpine areas with moist soils in Seitz and Echo canyons are sometimes dominated by broad-leaved herbaceous plants (fig. 14). A number of associations may be differentiated by dominants, such as *Polygonum phytolaccaefolium* or *Veratrum californicum*. Occasionally, grasses such as *Stipa columbiana* or *Agropyron trachycaulum* are abundant.

11. *Pinus albicaulis* (Pa):

Open subalpine forests are dominated by *Pinus albicaulis* in Seitz and Echo canyons (fig. 15). *Pinus flexilis* is present on occasion, but it does not dominate stands of trees here. Understory plants may be fairly diverse. Some common species found among the trees are *Ligusticum grayi*, *Mertensia oblongifolia*, and *Vaccinium uliginosum* ssp. *occidentale*.

12. Subalpine and alpine turf (At):

Subalpine and alpine turf, or moist meadow sites dominated by low growing plants occur in small patches throughout the area. Low growing willows, such as *Salix reticulata*, occur here with patches of the dominant *Geum rossii* var. *turbinatum*. Some areas are dominated by graminoids including *Carex elynoides*, *Festuca brachyphylla*, *Trisetum wolfii*,

and *Phleum alpinum*. Associated species include *Cryptogramma crista*, *Sibbaldia procumbens*, *Smelowskia calycina*, and *Antennaria umbrinella*. Although small in extent, these communities tend to be very diverse.

13. Alpine barrens (Ab):

Alpine talus and scree communities are prevalent in the RNA because of the large amount of alpine habitats. They occur on exposed, dry, and rocky slopes. In these barren communities, rock is the dominant cover with very low total plant cover (fig. 16). Numerous alpine species occur here, such as *Oxyria digyna*, *Hulsea algida*, *Silene acaulis*, *Primula parryi*, *Cystopteris fragilis*, and *Draba sphaeroides* var. *sphaeroides*. The barren relict area located centrally in the RNA provides habitat for rare *Primula capillaris* (figs. 17-18).

Fauna

Animals in the Seitz Canyon/Echo Lake RNA have not been thoroughly observed, collected, described, or studied. However, animals known or highly likely to be found in the RNA based on available habitat are listed in Table 7. Additional species of animals undoubtedly inhabit the area.

The Seitz Canyon/Echo Lake RNA provides habitat for seven animals of special concern with known ranges in the Ruby Mountains. The peregrine falcon (*Falco peregrinus*) and bald eagle (*Haliaeetus leucocephalus*) are federally endangered birds (Federal Register, 1991), while the spotted bat (*Euderma maculata*) is a federal category 2 candidate for listing as endangered or threatened under the Endangered Species Act (Federal Register, 1989). Also, one mammal and three birds are considered sensitive by the Intermountain Region—the western big-eared bat (*Plecotus townsendii*), flammulated owl (*Otus flammeolus*), great grey owl (*Strix nebulosa*), and three-toed woodpecker (*Picoides tridactylus*) (USDA Forest Service, 1991b).

Table 7. Animal species with known or potential occurrences in the Seitz Canyon/Echo Lake RNA. Scientific nomenclature follows Banks *et al.*, 1987.

Scientific name	Common name
Mammals	
<i>Sorex vagrans</i>	vagrant shrew
<i>Sorex palustris</i>	northern water shrew
<i>Myotis evotis</i>	long-eared myotis
<i>Myotis lucifugus</i>	little brown myotis

Table 7. Continued.

Scientific name	Common name
<i>Euderma maculata</i>	spotted bat
<i>Lasionycteris noctivagans</i>	silver-haired bat
<i>Eptesicus fuscus</i>	big brown bat
<i>Lasiurus cinereus</i>	hoary bat
<i>Plecotus townsendii</i>	western big-eared bat
<i>Mustela erminea</i>	short-tailed weasel
<i>Mustela frenata</i>	long-tailed weasel
<i>Spilogale gracilis</i>	spotted skunk
<i>Canis latrans</i>	coyote
<i>Urocyon fulva</i>	red fox
<i>Felis concolor</i>	mountain lion
<i>Lynx rufus</i>	bobcat
<i>Ovis canadensis</i>	Rocky Mountain bighorn sheep
<i>Cervus elaphus</i>	Rocky Mtn. elk
<i>Odocoileus hemionus</i>	mule deer
<i>Sylvilagus nuttalli</i>	mountain cottontail
<i>Lepus townsendi</i>	white-tailed jackrabbit
<i>Erethizon dorsatum</i>	porcupine
<i>Castor canadensis</i>	beaver
<i>Marmota flaviventris</i>	yellow-bellied marmot
<i>Spermophilus lateralis</i>	golden-mantled ground squirrel
<i>Tamias amoenus</i>	yellow-pine chipmunk
<i>Tamias minimus</i>	least chipmunk
<i>Tamias dorsalis</i>	cliff chipmunk
<i>Tamias quadrivittatus</i>	Colorado (Says) chipmunk
<i>Spermophilus beldingi</i>	Belding ground squirrel
<i>Spermophilus lateralis</i>	golden-mantled ground squirrel
<i>Thomomys talpoides</i>	northern pocket gopher
<i>Perognathus parvus</i>	Great Basin pocket mouse
<i>Peromyscus maniculatus</i>	deer mouse
<i>Neotoma cinerea</i>	bush-tailed woodrat
<i>Microtus montanus</i>	montane vole
<i>Zapus princeps</i>	western jumping mouse
Birds	
<i>Cathartes aura</i>	turkey vulture
<i>Accipiter gentilis</i>	goshawk
<i>Accipiter striatus</i>	sharp-shinned hawk
<i>Accipiter cooperi</i>	Cooper's hawk

Table 7. Continued.

Scientific name	Common name
<i>Buteo jamaicensis</i>	red-tailed hawk
<i>Aquila chrysaetos</i>	golden eagle
<i>Haliaeetus leucocephalus</i>	bald eagle
<i>Falco peregrinus</i>	peregrine falcon
<i>Falco sparverius</i>	American kestrel
<i>Dendragapus obscurus</i>	blue grouse
<i>Asio otus</i>	long-eared owl
<i>Otus flammeolus</i>	flamulated owl
<i>Otus kennicottii</i>	western screech-owl
<i>Bubo virginianus</i>	great horned owl
<i>Strix nebulosa</i>	great grey owl
<i>Glaucidium gnoma</i>	northern pygmy owl
<i>Chordeiles minor</i>	common nighthawk
<i>Phalaenoptilus nuttallii</i>	poor will
<i>Selasphorus rufus</i>	rufous hummingbird
<i>Selasphorus platycercus</i>	broad-tailed hummingbird
<i>Stellula calliope</i>	calliope hummingbird
<i>Aeronantes saxatalis</i>	white-throated swift
<i>Colaptes auratus</i>	common flicker
<i>Sphyrapicus varius</i>	yellow-bellied sapsucker
<i>Sphyrapicus thyroideus</i>	Williamson's sapsucker
<i>Dendrocopos pubescens</i>	downy woodpecker
<i>Dendrocopos villosus</i>	hairy woodpecker
<i>Picoides tridactylus</i>	northern three-toed woodpecker
<i>Empidonax difficilis</i>	western flycatcher
<i>Empidonax oberholseri</i>	dusky flycatcher
<i>Contopus sardidulus</i>	western wood peewee
<i>Nuttallornis borealis</i>	olive-sided flycatcher
<i>Tachycineta thalassina</i>	violet-green swallow
<i>Iridoprocne bicolor</i>	tree swallow
<i>Cyanocitta stelleri</i>	Stellar's jay
<i>Nucifraga columbiana</i>	Clark's nutcracker
<i>Corvus corax</i>	common raven
<i>Parus gambeli</i>	mountain chickadee
<i>Psaltiriparus minimus</i>	bushtit
<i>Sitta canadensis</i>	red-breasted nuthatch
<i>Certhia familiaris</i>	brown creeper
<i>Turdus migratorius</i>	American robin
<i>Catharus guttatus</i>	hermit thrush

Table 7. Continued.

Scientific name	Common name
<i>Catharus ustulata</i>	Swainson's thrush
<i>Zenaida macroura</i>	mourning dove
<i>Sialia currucoides</i>	mountain bluebird
<i>Regulus satrapa</i>	golden-crowned kinglet
<i>Regulus calendula</i>	ruby-crowned kinglet
<i>Vireo gilvus</i>	warbling vireo
<i>Dendroica coronata</i>	yellow-rumped warbler
<i>Dendroica townsendi</i>	Townsend's warbler
<i>Dendroica nigrescens</i>	black-throated gray warbler
<i>Oporonis tolmiei</i>	MacGillivray's warbler
<i>Piranga ludoviciana</i>	western tanager
<i>Pheucticus melanocephalus</i>	black-headed grosbeak
<i>Hesperiphona vespertina</i>	evening grosbeak
<i>Pinicola enusleator</i>	pine grosbeak
<i>Leucosticte tephrocotis</i>	gray-crowned rosy finch
<i>Leucosticte atrata</i>	black rosy finch
<i>Spinus pinus</i>	pine siskin
<i>Junco hyemalis</i>	dark-eyed junco
<i>Spizella passerina</i>	chipping sparrow
<i>Spizella breweri</i>	Brewer's sparrow
<i>Passerelle iliaca</i>	fox sparrow
<i>Zonothracia leucophrys</i>	white-crowned sparrow
<i>Pipilo chlorura</i>	green-tailed towhee
Reptiles and Amphibians	
<i>Sceloporus graciosus</i>	sagebrush lizard
<i>Charina bottae</i>	rubber boa
<i>Diadophis punctatus</i>	ringneck
<i>Coluber constrictor</i>	racer
<i>Mastiophis flagellum piceus</i>	red racer
<i>Thamnophis elegans</i>	gartersnake
<i>Crotalus viridis</i>	rattlesnake
<i>Diadophis punctatus</i>	ring-necked snake
<i>Sceloporus occidentalis biseriatus</i>	Great Basin fence lizard
<i>Uta stansburiana</i>	northern side blotch lizard
<i>Eumeces skiltonianus utahensis</i>	Great Basin skink
<i>Pituophis melanoleucus deserticola</i>	Great Basin gopher snake

Geology

The geology and structure of the Ruby Mountains are fairly well-studied (Sharp, 1939a; Sharp, 1939b; Sharp, 1940; Willden and Kistler, 1967; Willden and Kistler, 1969; Snoke, 1980) and a geologic map of the range has been published (Howard *et al.*, 1979).

The Ruby Mountains are a typical Great Basin fault-blocked mountain range trending north northeast–south southwest with an clear westward tilt (Sharp, 1939a; Sharp, 1940). The core of the range is composed of metamorphic and igneous rocks including gneiss, gneissose granite, migmatites, quartzose schist, and calcic-silicate rocks. Overlying this core are brittly-deformed sedimentary and volcanic rocks of Paleozoic and Tertiary age. Near Echo Lake, brown-weathering metaquartzites and unfossiliferous marbles predominate (Howard *et al.*, 1979).

The Ruby Mountains were the most heavily glaciated range in the state during the Pleistocene (Sharp, 1940). The deep recesses, cirque basins and cliffs, sharp ridges, glacial lakes, and U-shaped valleys present today at higher elevations are evidence of this past glaciation.

Landtypes and Soils

Landtypes in the Seitz Canyon/Echo Lake RNA are generally steep, high-mountainous glaciated lands. Landforms include cirque basins, high rocky peaks and cols, steep-walled glaciated U-shaped canyons, and an unglaciated relict area (nunatak).

A reconnaissance-level soil survey of the Ruby Mountains was made by the Forest Service (Crockett, 1967). Canyon bottoms are gently sloping and have morainal features present. Exposed bedrock is only slightly weathered. Soils in the bottoms are extremely cobbly or stony, deep to very deep, well-drained, and loamy. Canyon sideslopes, higher slopes, and ridges are steep to very steep. Many rock outcrops and talus slopes are present. In areas, soils are moderately deep, very stony to extremely stony, and loamy or coarse loamy. However, in most alpine areas there is little or no soil development.

Lands

The lands within the Seitz Canyon/Echo Lake RNA are all reserved National Forest land with no encumbrances.

Cultural

There are no known cultural resources in the Seitz Canyon/Echo Lake RNA.

Impacts and Possible Conflicts

Mineral Resources

There are no patented or unpatented mining claims located within the boundary of the Seitz Canyon/Echo Lake RNA. The RNA does not contain known energy or mineral resources, such as ore deposits. The wilderness designation prohibits future exploration and claim location within the RNA that overlaps with the Ruby Mountains Wilderness Area. Mineral resources pose no conflict with the RNA designation.

Grazing

Seitz and Echo canyons are within cattle and horse grazing allotments. Livestock move into the canyons and graze during the summer grazing season to about the 8,000-8,500 ft (2,438-2,591 m) elevation. Above this range, the terrain steepens considerably, large expanses of bedrock and talus predominate, and desirable forage diminishes rapidly. Cattle do not graze the higher elevations of Seitz and Echo canyons. The higher subalpine and alpine lands encompassed by the RNA are classified as unsuitable for grazing.

No evidence of recent grazing was found inside the boundary of the RNA. Small areas around Seitz Lake are dominated by plant species that may have increased in abundance during sheep grazing periods in the last century. With the lack of present grazing, these species will gradually diminish in abundance as graminoids regain a foothold.

Timber

The amount of forested area in the Seitz Canyon/Echo Lake RNA is 320 acres (120 ha). None is commercial forest. Therefore, commercial timber values pose no conflict with the RNA designation.

Watershed Values

The RNA has high watershed values. The subalpine and alpine lands of upper Seitz and Echo canyons normally accumulate deep snowpacks in winter. These lands contribute flows to the Humboldt River Basin.

Recreation Values

Dispersed recreation occurs in the area. Hiking, fishing, and hunting are the main recreational activities. A few small campsites are present at Echo and Seitz lakes. Signed

entries in the mountaineer's register on Ruby Dome indicated a relatively low level of visitation. The general remoteness of the area keeps recreational activity level low, and this level is compatible with RNA designation.

Wildlife and Plant Values

Three plant taxa and seven animal species of concern inhabit the Seitz Canyon/Echo Lake RNA (see sections on flora and fauna). Their presence is compatible with the RNA and even helps to justify the research designation. The rare species could be the focus of future research proposals.

Special Management Area Values

Seitz Canyon/Echo Lake RNA lies partially within the Ruby Mountains Wilderness Area—about 660 acres (267 ha) overlap. Wilderness and research natural area management essentially pose no conflicts with one another in this remote setting. Objectives of wilderness and RNA management both seek to maintain natural ecological processes and conditions.

Transportation Plans

Trails in the area will be maintained. There are no other transportation plans for the area.

Management Prescription

Vegetation Management

In general, no special management practices are required to maintain the ecological conditions within Seitz Canyon/Echo Lake RNA. Naturally occurring wildfires will not be mechanically suppressed unless they pose a threat to life or property, in which case they will be suppressed with the least destructive methods possible.

Livestock grazing will not be permitted.

Administration, Records, and Protection

Administration and protection of the Seitz Canyon/Echo Lake RNA is the responsibility of the Ruby Mountains District Ranger, Humboldt National Forest, Wells,

Nevada. Approval and coordination of research in the RNA is the responsibility of either the Intermountain Regional Forester, Ogden, Utah, for the area within the Ruby Mountains Wilderness Area, or the Director of the Intermountain Forest and Range Experiment Station, Ogden, Utah, for lands outside of the wilderness boundary. Copies of all research proposals will be sent to the District Ranger for review and information. The office of the Regional Forester will maintain all proposal, contract, and agreement files.

The Director of the Intermountain Station, or the director's designate, will be responsible for maintaining research data files and lists of plant and animal specimens collected in the Seitz Canyon/Echo Lake RNA. All collected specimens will be properly preserved and maintained within federal or university herbaria and museums approved by the Station Director. The Washington Office RNA Coordinator will be informed of locations of all specimens via memorandum by the office of the Station Director within one year of the establishment of the RNA.

No special protection needs are needed for the Seitz Canyon/Echo Lake RNA.

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Appendix A

Humboldt National Forest Land and Resource Management Plan

These pages are attached as Appendix A:

Cover page

II-29 through II-30

IV-62 through IV-63



United States
Department of
Agriculture



Humboldt National Forest Land and Resource Management Plan

These pages have been
copied from final Forest Plan
and accessory documents.

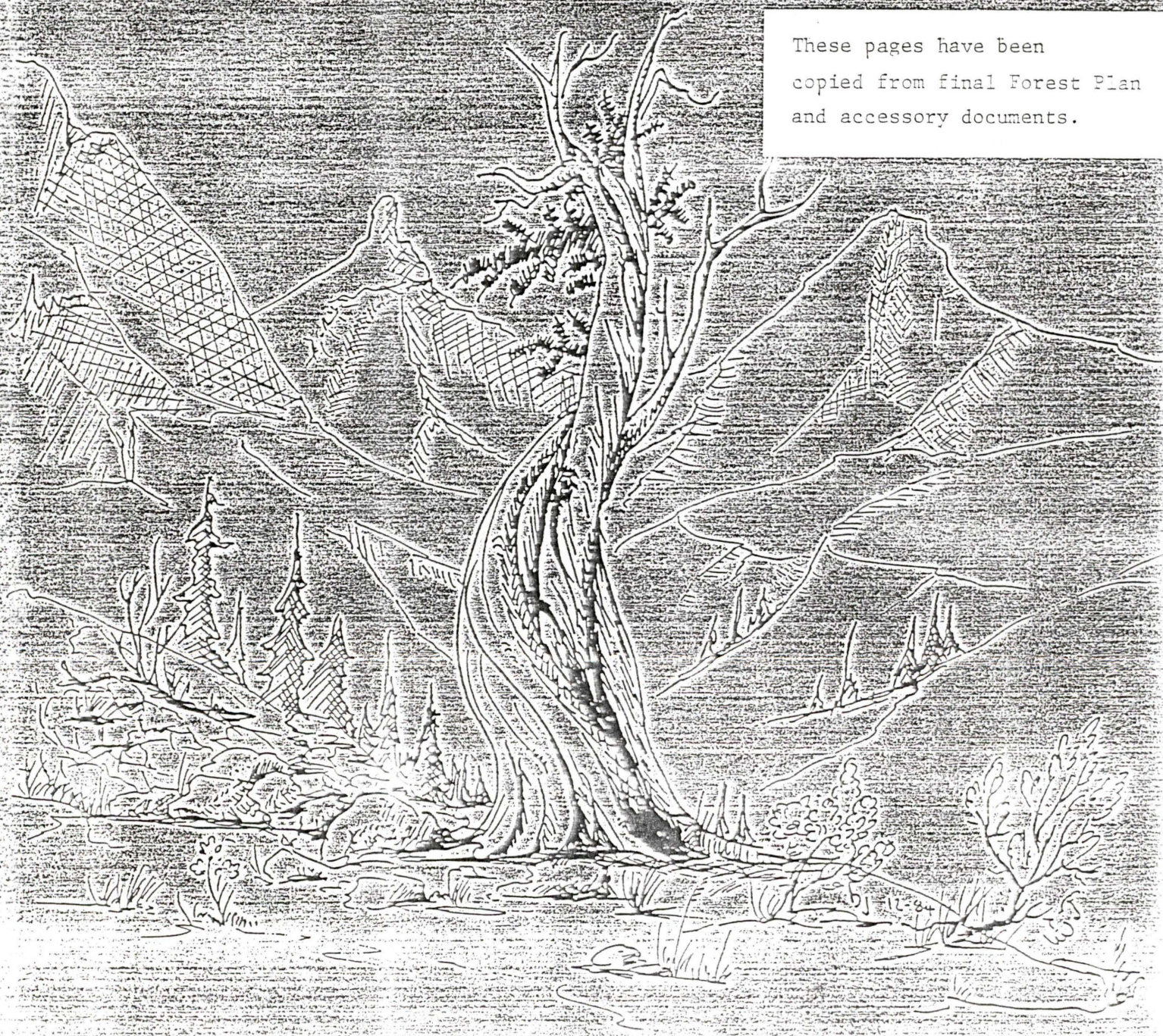


TABLE II-14
Summary of Special Land Use Permits

Kind of Use	Total Cases	Total Miles ROW Length	Total Acres Permitted Area
Recreation	27	0	66
Agriculture	11	4	479
Community	5	1	5
Industrial	4	0	29
Research, Study, Training	12	0	108
Transportation	46	105	334
Utilities Communication	69	154	1,943
Water	<u>76</u>	<u>664</u>	<u>437</u>
TOTAL	250	928	3,401

Requests for the various special uses will increase substantially in future years. Accommodating the proposed uses will become more difficult without conflicting with other Forest management activities.

c. Research Natural Areas

The Forest at the present time has no areas classified as Research Natural Areas (RNA). However, there are five sites that have been inventoried as candidate Research Natural Areas:

(1) Mt. Washington Bristlecone Pine Stand

Approximately 260 acres located in portions of Sections 11 and 12, T.12N., R.68E., Mount Diablo Baseline Meridian (MDBM). This area is located in White Pine County, Ely Ranger District. A principal feature is a stand of old bristlecone pines, which can be used to build chronologies through tree-ring research. Also present are stands codominated by litter and bristlecone pines, typical of subalpine forests in the east-central Great Basin.

(2) White Pine Peak

Approximately 670 acres located in portions of Sections 20, 28, 29, 32 and 33, T.12N., R.58E., MDBM. The peak is located in Nye county, Ely Ranger District. The principal feature of this area is a "native rangeland", consisting of sagebrush-grass communities in nearly pristine condition, which are scarce in the Great Basin. Also present are small stands of white fir and of limber pine/bristlecone pine. This area is important in providing an area suitable for conducting research on high elevation sagebrush sites.

(3) Sietz Canyon

Approximately 980 acres located in portions of Sections 20, 21, 28, 29, 32 and 33, T.32N., RR.58E., MDBM. The canyon is located in Elko County, Ruby Mountain Ranger District. This area features a rich and diverse floral component. Many types of plant communities are present, including riparian wetlands, subalpine herb and shrublands, and alpine herblands. The canyon also exhibits metamorphic rock types and effects of alpine glaciation, neither of which are common in the Great Basin. This area is important in providing a site for conducting riparian classification and management research.

(4) Jack Creek Crater

Approximately 250 acres located in portions of Sections 26 and 27, T.46N., R.58E., MDBM. The crater is located in Elko County, Jarbidge Ranger District. The principal feature is a stand codominated by whitebark pine and subalpine fir, neither of which is well represented in the Great Basin. Small riparian communities are also present.

(5) Pearl Peak

Approximately 640 acres located in portions of Sections 3, 4, 9 and 10, T.27N., R.57E., MDBM. The peak is located in Elko County, Ruby Mountain Ranger District. Its principal features are ungrazed sagebrush-grass types at middle and lower elevations, and a limber pine/bristlecone pine woodland at upper elevations. Some of the bristlecones may be very old, and thus useful for dendrochronological research.

3. Soils

The soils within the Humboldt National Forest vary considerably depending on landform, geology, vegetation, and geomorphic processes. The Forest is located primarily in the Basin and Range physiographic province with a large variety of parent materials present. These geologic units include hard and soft sedimentaries, metamorphics, igneous, and volcanic rock types.

Broad associations exist between vegetation communities and soils on the Forest. These are as follows:

Forest-Wide Management Direction, Standards, and Guidelines

PRACTICES	MIH CODE	MANAGEMENT DIRECTION	STANDARDS AND GUIDELINES
<u>LANDS (Cont.)</u>			
Land Exchange	J13		6. Lands that will not decrease key big game winter range capacity on a Forest-wide basis. Respond to land exchange offers within 3 months. The proponent will be notified whether the proposal appears to be in the best interest of the United States, and if so, when action will begin on the proposal.
Acquisition or	J14		
Transfer (Cont.)	J15		
	J16		
ROW Acquisition	J18	Acquire road and trail rights-of-way in accordance with the Forest Action Schedule and as additional opportunities arise.	Limited easements may be acquired for National Forest System roads where public vehicle use is not desirable. Priority will be given to acquiring rights-of-way under full jurisdiction of the United States.
Research Natural Areas		Protect Research Natural Areas (RNAs) from disturbance while they are being considered for designation and following designation.	<p>Prohibit construction of developed recreation sites.</p> <p>Discourage or prohibit any public use which impairs research or educational values.</p> <p>Permit and encourage use by scientists and educators.</p> <p>Prohibit any direct habitat manipulation.</p> <p>Restrict livestock grazing to that essential for the maintenance of a specific vegetative type.</p> <p>Close RNAs to all wood and wood product removal.</p> <p>Use special use permits or cooperative agreements to authorize and document scientific activity.</p> <p>Withdraw RNAs from mineral entry in conformance with Section 204 of FLMPA of 1976.</p>

IV-62



Forest-Wide Management Direction, Standards, and Guidelines

PRACTICES	MIH CODE	MANAGEMENT DIRECTION	STANDARDS AND GUIDELINES
<u>LANDS (Cont.)</u>			
Research Natural Areas (Cont.)			<p>Withdraw RNAs from mineral entry following their designation as an RNA.</p> <p>Generally, physical improvements such as roads are not permitted.</p> <p>Limit trails to those needed for access to conduct research and for educational purpose.</p> <p>Extinguish wildfires endangering RNAs. Allow wildfires within the RNAs to burn undisturbed unless they threaten people or property outside the area or the uniqueness of the RNAs.</p> <p>Do not reduce fire hazard within RNAs.</p> <p>Close RNAs to all motorized vehicle travel.</p> <p>Take no action against endemic insects, diseases, or wild animals.</p>
		Return proposed RNAs to multiple use management if they are not designated as RNAs.	
<u>FACILITIES</u>			
Road Design, Construction/Reconstruction, and Maintenance	L01 L12 L13	Roads shall be constructed or upgraded by the user to a standard compatible with the proposed use.	<p>Roads will be constructed along the planned route.</p> <p>Require a permit or cooperative agreement before allowing snowplowing on Forest development roads.</p>

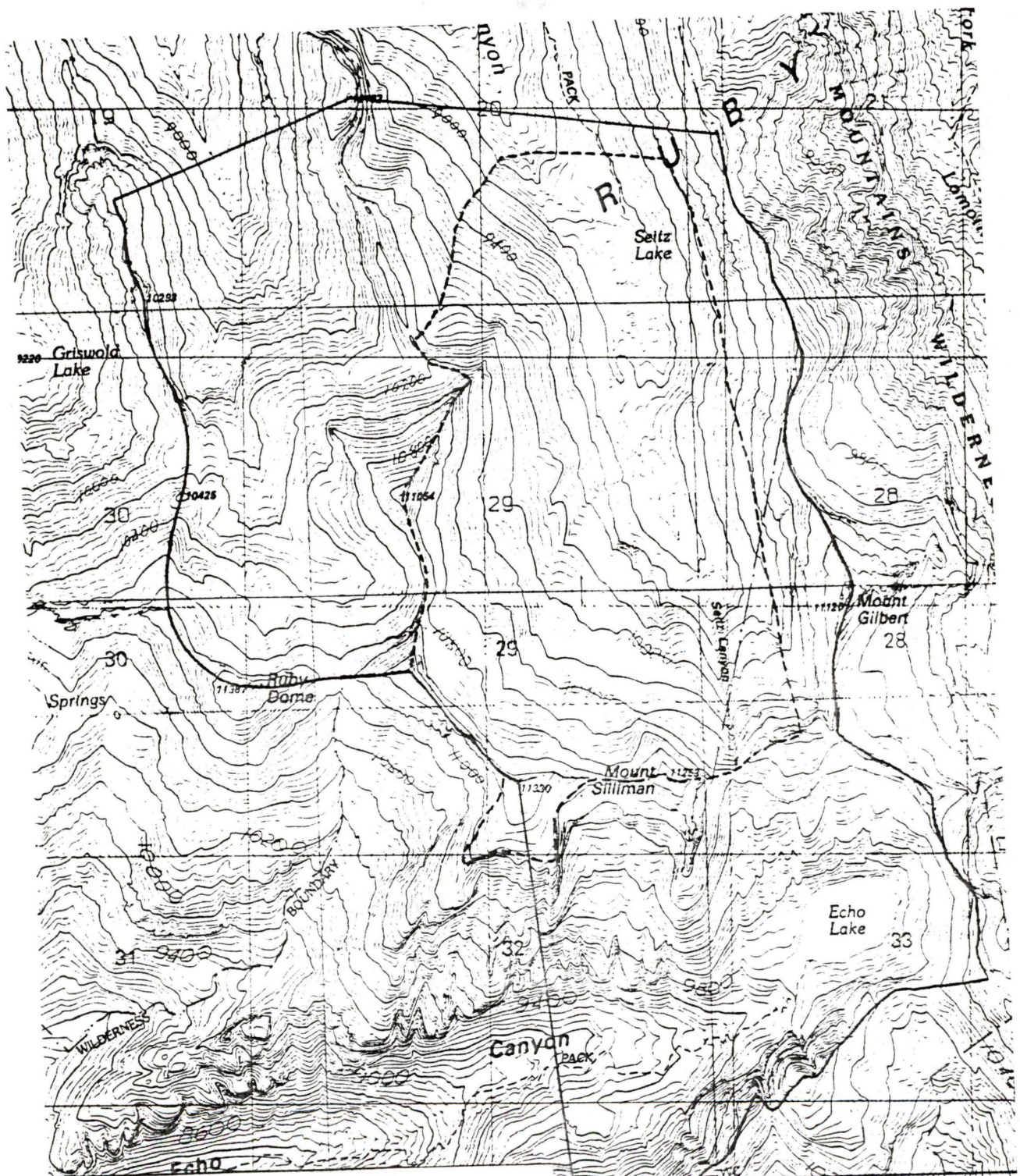


Figure 2

RECOMMENDED BOUNDARY OF
SEITZ CANYON/ECHO LAKE RESEARCH NATURAL AREA

USGS 1:24,000 scale Lamoille and Ruby Dome
topographic quadrangles

Recommended RNA boundary solid line
Previously proposed RNA boundaries dashed line

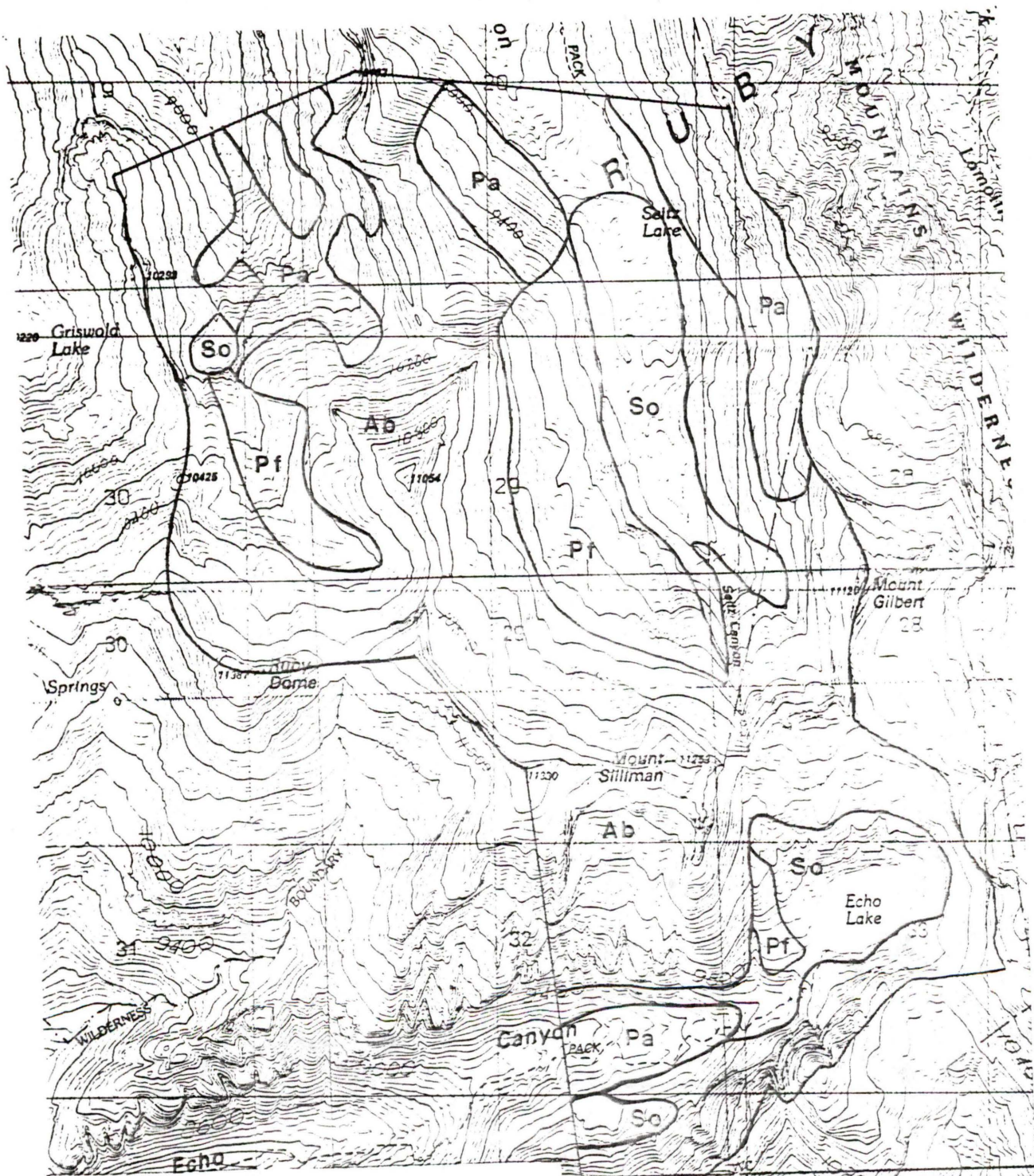


Figure 3

VEGETATION (MAJOR PLANT COMMUNITIES) OF SEITZ CANYON/ECHO LAKE RESEARCH NATURAL AREA

USGS 1:24,000 scale Lamoille and Ruby Dome
topographic quadrangles

Legend

So *Salix orestera*
Pa *Pinus albicaulis*

Pf *Potentilla fruticosa*
Ab alpine barrens